Lesson 6-6 - Quadrilateral Proofs

Agenda

- Check HW 6.5
- Regents Week
- Guided Notes 6.6

HW:

6.6 Worksheet (Problem Set in Notes)

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p. 432-433: #27,30,32,34,35

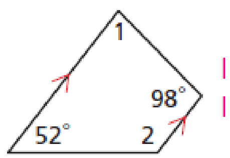
Find the measure of

28. $m\angle 1 = 116°$; $m\angle 2 = 46°$

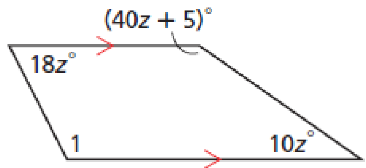
29. $m\angle 1 = 51°$; $m\angle 2 = 16°$

30. $m\angle 1 = 112°$; $m\angle 2 = 40°$

27.

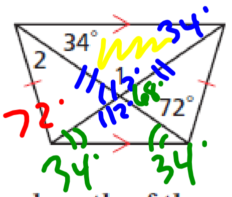


32.



$m\angle 1 = 117°$

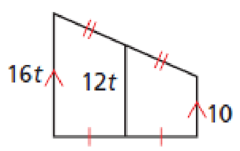
30.



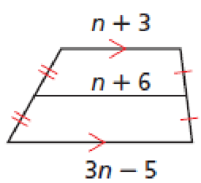
Δ sum
68° + m∠1 = 180°
112°
112° + x + x = 180

Algebra Find the length of the midsegment of each trapezoid.

34. 15



35. 13



36.

Unit 6 Day 6 Quadrilateral Proofs

Given Quadrilaterals

Use properties of given quadrilaterals to get a relationship within a pair of segments and angles. This can give you triangle congruency criteria, isosceles triangle theorems, transitive/substitution, or another type of quadrilateral.

Parallelograms

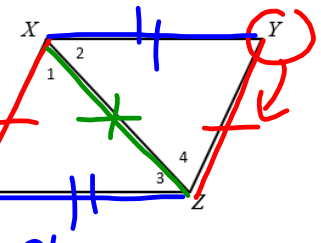
- Parallel Segments/Lines (opposite sides) → congruent or supplementary angles
- Perpendicular Segments/lines (consecutive sides/diagonals) → Right angles
- Segment Bisectors (diagonals) → congruent segments
- Congruent Segments (opposite sides, consecutive sides)

→ RT ∠'s
→ ≅ ∠'s

Trapezoids

- Parallel Segments/Lines (1 set of opposite sides) → congruent or supplementary angles
- Congruent Segments (legs/diagonals of an isosceles trapezoid)
- Congruent Angles (base angle pairs of an isosceles trapezoid)

1. Given $\square WXYZ$, write a plan to prove $\triangle WXZ \cong \triangle YZX$ using:



A. SSS≅

S S S

REFLEXIVE

→ OPPOSITE SIDES ≅

→ OPP SIDES ≅

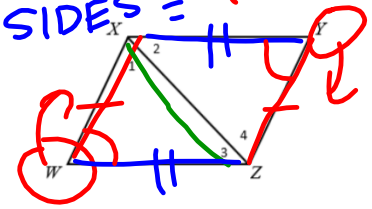
B. SAS≅ where you use $\angle W$ and $\angle Y$

S A S

→ OPP SIDES ≅

→ OPP ∠'s ≅

→ OPP SIDES ≅



C. ASA≅ where you use $\overline{XZ}$

A S

$\overline{WX} \parallel \overline{YZ}$ REFL.

*

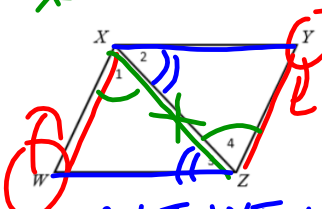
A

$\overline{XY} \parallel \overline{WZ}$

*

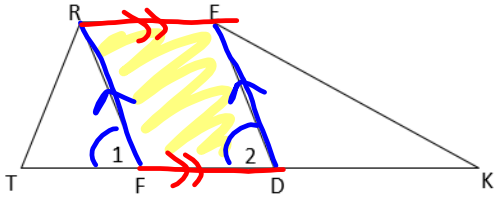
→ || OPP SIDES

ALT INT ∠'s ≅



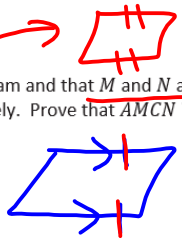
→ ∥ → CORR ∠'S ≅ → ∥

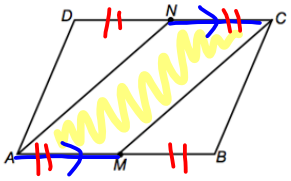
2. Given: TREK is a trapezoid; $\angle 1 \cong \angle 2$
Prove: FRED is a parallelogram



1) TREK IS A TRAPEZOID	1) GIVEN
2) $\overline{RE} \parallel \overline{FD}$	2) TRAPEZOID → 1 SET OPP SIDES ∥
3) $\angle 1 \cong \angle 2$	3) GIVEN
4) $\overline{FR} \parallel \overline{DE}$	4) ≅ CORR ∠'S → ∥
5) ▱ FRED	5) BOTH PAIRS OPP SIDES ∥ → ▱

3. Suppose that $ABCD$ is a parallelogram and that M and N are the midpoints of $\overline{AB}$ and $\overline{CD}$, respectively. Prove that $AMCN$ is a parallelogram.





∥ ≅

▱ ABCD (GIVEN)

- → $\overline{AB} \parallel \overline{CD}$ (▱ → OPP SIDES ∥)
- → $\overline{AB} \cong \overline{CD}$ (▱ → OPP SIDES ≅)

M & N ARE MDPTS OF $\overline{AB}$ & $\overline{CD}$ (GIVEN)

→ $\overline{DN} \cong \overline{NC}$, $\overline{AM} \cong \overline{MB}$ (DEFN OF MDPT)

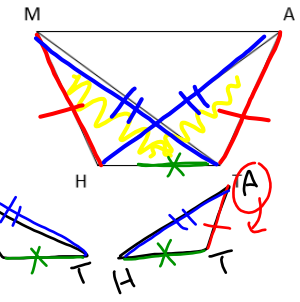
→ $\overline{NC} \cong \overline{AM}$ (HALVES OF ≅ SEGMENTS ARE ≅)

▱ AMCN B/C 1 SET OF OPPOSITE SIDES IS ∥ & ≅

4. Complete the following proof using any format:

Given: Isosceles trapezoid MATH
Prove: $\Delta MHT \cong \Delta ATH$

≅ LEGS
≅ DIAG



S
ISOS TRAP MATH
GIVEN
$\overline{MH} \cong \overline{AT}$
ISOS TRAP → ≅ LEGS

S
$\overline{TH} \cong \overline{HT}$
REFLEXIVE

S
ISOS TRAP MATH
GIVEN
$\overline{MT} \cong \overline{AH}$
ISOS TRAP → ≅ DIAGONALS

$\Delta MHT \cong \Delta ATH$
BY SSS ≅ SSS

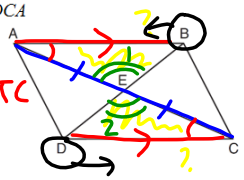
OR SAS ≅ SAS
W/O DIAG
ISOS TRAP → ≅ BASE ∠'S

Proving Quadrilaterals through Congruent Triangles & CPCTC

To prove a type of quadrilateral, use given information to 1) get congruent triangles and 2) use corresponding parts of congruent triangles to 3) satisfy a set of conditions for a parallelogram or trapezoid.

5. Given: Quadrilateral ABCD with diagonals interesting at E; $\overline{AE} \cong \overline{CE}$; $\angle BAC \cong \angle DCA$
Prove: ABCD is a parallelogram

→ ||



① ≅ △S BY ASA
② $\overline{AB} \cong \overline{DC}$ BY CPCTC
③ ▱ → ▱

A
$\angle BAC \cong \angle DCA$
GIVEN

S
$\overline{AE} \cong \overline{CE}$
GIVEN

A
$\angle 1 \cong \angle 2$
VERTICAL ∠'S ARE ≅

$\Delta BAE \cong \Delta DCE$ BY ASA ≅
$\overline{AB} \cong \overline{CD}$ BY CPCTC
$\overline{AB} \parallel \overline{CD}$ ≅ ALT INT ∠'s → ||

▱ ABCD 1 SET OPP SIDES IS || & ≅

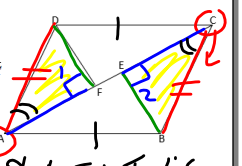
Putting It All Together

AAS
~~ASA~~

6. Complete the following proof using any format:

Given: Quadrilateral ABCD, $\overline{AFEC}, \overline{AB} \cong \overline{CD}, \overline{AD} \cong \overline{CB}, \overline{DF} \perp \overline{AC}, \overline{BE} \perp \overline{AC}$

Prove: 1) ABCD is a parallelogram
2) $\Delta ADF \cong \Delta BCE$



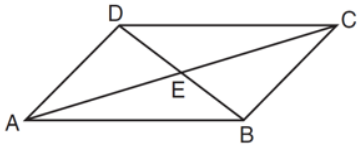
≠ ≠ → ||
OPP SIDES → ≅ ALT INT ∠'S

(1)

1) $\overline{AB} \cong \overline{CD}$; $\overline{AD} \cong \overline{CB}$ (S) 1) GIVEN
2) ▱ABCD 2) BOTH PAIRS OPP SIDES ≅ → ▱
(2) 3) $\overline{AB} \parallel \overline{CD}$ 3) ▱ → OPP SIDES
4) ∠DAF ≅ ∠BCE (A) 4) || → ALT INT ∠'s ≅
5) $\overline{DF} \perp \overline{AC}$ $\overline{BE} \perp \overline{AC}$ 5) GIVEN
6) ∠1 & ∠2 ARE RT ∠'S 6) ⊥ → RT ∠'S
7) ∠1 ≅ ∠2 (A) 7) ALL RT ∠'S ARE ≅
8) ΔADF ≅ ΔBCE 8) AAS ≅ AAS (STEPS 7, 4, 1)

Problem Set 6-6R

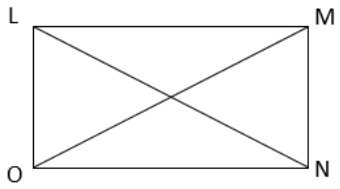
1. In parallelogram *ABCD* shown below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E*.
Prove: $\Delta AED \cong \Delta CEB$



2. Complete the following proof using any format:

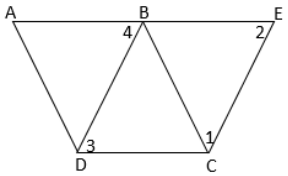
Given: $\square LMNO;\ \overline{LN} \cong \overline{MO}$

Prove: ΔNOL is a right triangle



3. Given: $\Delta ADB \cong \Delta CDB; \overline{BC} \cong \overline{CD}$

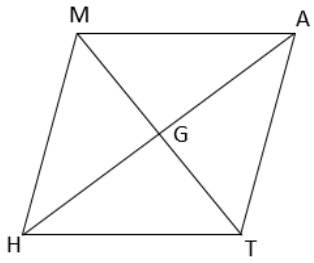
Prove: 1) ABCD is a parallelogram
2) ABCD is a rhombus



4. Complete the following proof using any format:

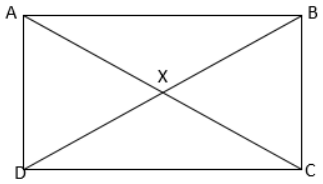
Given: Rhombus MATH with diagonals intersecting at G

Prove: $\Delta MAG \cong \Delta TAG$



5. Given: Rectangle ABCD with diagonals intersecting at X

Prove: ΔAXB is isosceles



Statements	Reasons
1) ABCD is a rectangle with diagonals intersecting at X	1) Given
2) $\overline{AC} \cong \overline{BD}$	2) _____
3) Rectangle ABCD is a parallelogram	3) A rectangle is a parallelogram
4) $\overline{AC}$ & $\overline{BD}$ bisect each other	4) _____
5) _____	5) Definition of a segment bisector
6) $\overline{AX} \cong \overline{XC} \cong \overline{BX} \cong \overline{XD}$	6) _____
7) ΔAXB is isosceles	7) _____